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ABSTRACT

Gestural behavior between mothers and young children was hypothesized to be important in the acquisition of communicative competence. It was presumed that a typology of gestural function could assess non-verbal behavior. Data consisted of sound film samples of feeding and bathing events of three subject pairs. Initially the children ranged in age from 19-21 months. The children exceeded their mothers in the use of gestural behavior at each time period and children's gestural behavior significantly decreased over time. Although maternal gestural behavior generally decreased over time, an increase at Time IV occurred. Mothers used gesture to assess and reinforce existing knowledge. Analysis of non-verbal behavior indicated that dissimilar gestural functions are expressed by similar motor acts and, conversely, that dissimilar motor acts express similar functions. Analysis of gestural functions subsumed equivalent to complementary verbal functional categories showed that children's gestures support linguistic skills. Some gestures were believed to map symbolic behavior, other non-symbolic gestures demonstrated reliance on non-verbal behavior to acquire skills of communicative competence. (Author)

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THE FUNCTION OF GESTURAL BEHAVIOR IN INTERACTION BETWEEN MOTHERS AND THEIR LANGUAGE-LEARNING CHILDREN

Ellen Parker, Ph.D.

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ABSTRACT

The Function of Gestural Behavior in Interaction Between Mothers and Their Language Learning Children

Dr. Ellen Parker

Gestural behavior between mothers and young children was hypothesized to be important in the acquisition of communicative competence. It was presumed that a typology of gestural function could assess non-verbal behavior. Data consisted of sound film samples of feeding and bathing events of three subject pairs. Initially the children ranged in age from 19-21 months. The children exceeded their mothers in the use of gestural behavior at each time period and children's gestural behavior significantly decreased over time. Although maternal gestural behavior generally decreased over time, an increase at Time IV occurred. Mothers used gesture to assess and reinforce existing knowledge. Analysis of non-verbal behavior indicated that dissimilar gestural functions are expressed by similar motor acts and, conversely, that dissimilar motor acts express similar functions. Analysis of gestural functions subsumed equivalent to complementary verbal functional categories showed that children's gestures support linguistic skills. Some gestures were believed to map symbolic behavior, other non-symbolic gestures demonstrated reliance on non-verbal behavior to acquire skills of communicative competence.

The development of communicative competence (the ability to express ideas appropriately in social interchange) is viewed as critical for the language learning child to function effectively in a social environment. As Rees (1975) has indicated, communicative competence involves more than the production and comprehension of speech. Not limited solely to the linguistic system, the ability to exchange meaningful information would appear to include the use of gestural and paralinguistic communication as well.

Following Bloom's (1970) contribution demonstrating that both the form and function of emerging language are tied to contextual information, contemporary study of the process of language acquisition has focused on strategies used by both caretakers and children to extract meaning from the environment. Both Slobin (1973) and Ervin-Tripp (1973) have pointed to the necessity for the child to understand physical and social events encoded in language as well as to process linguistic information.

Initial exploration of the child's ability to ascribe communicative intentions to linguistic exchange has been reported by Dore (1974, 1975). Although gestural behavior occurring within the context of the utterance was noted, systematic inquiry into the specific functions of gestural behavior was excluded. More specific assessment of the relationship between gestural and linguistic behavior has

been undertaken by Moerk (1972, 1974a, 1974b), Bruner (1975), and Sugarman Bell (In Press). Sugarman Bell and Bruner have noted the ontogenesis of cognitive schema regarding action resulting from gestural behavior between mothers and pre-verbal children. Moerk has interpreted his data as evidence that the language learning child develops a hierarchy of gestural use as a substitute for, as parallel to, or as complementary to linguistic expression; until the verbal message assumes dominance and becomes increasingly more sufficient for communication.

The purpose of this study was to identify the possible relationship between the functions of gestural and verbal behavior in the development of communicative competence. As functions of verbal categories have been isolated in the linguistic performance of emerging language systems (Bloom, 1970), it was hypothesized that gestural behavior also has functional parameters. If, as presumed, adults contribute to communicative exchange with children by pointing to objects, touching objects or people, emphasizing pantomimic and facial gestures, their attempts to interpret the physical-social environment would be expected to decrease proportionally as the children became increasingly competent linguistically. This inquiry looked at how gestures are used to assist in the acquisition of meaning, whether gestures serve similar functions for both mothers and children,

and what, if any, relationship exists between gestural behavior and linguistic skills.

Method

A semi-longitudinal study of three mother-child subject pairs was undertaken to observe non-structured communication. The children, Reno, David, and Peter, were male singletons and at the onset of study ranged in age from 19 to 21 months. Sound films of feeding and bathing events in the home of each dyad were taken on two consecutive days each month, for a four-month period. The instrumentation used was the KODAK EKTASOUND 130 Movie Camera and a GRUNDIG Model C215 tape-recorder in order to produce audio tapes from the sound track of the films and transcripts of the data. Data at each time period consisted of 18 minutes of consecutively filmed bathing and feeding samples. To assure reliable samplings, the subjects were visited on two consecutive days each month and event samples of 9 minutes each of bathing and feeding segments were filmed on successive days. Data for each time period represented a sample of a 1-1/2 to 2-hour observation time within each home each day. This observational time, although unrecorded, provided intuitive support for the validity of the films.

Procedure for Analysis

The sound track of the filmed data was transferred to audio tapes and final typescripts showing both verbal and

parallel gestures were prepared. An observer using random samples of the data also prepared transcripts resulting in 95% agreement with the investigator's transcripts.

Three judges rated the occurrence of verbal and non-verbal behaviors according to a Frequency Scale of Interactive Behaviors. Categories of this Scale were established based on the intuitive hypotheses of the author and observations resulting from prior pilot study. The ability to isolate behaviors determined their inclusion as discrete units. Verbal behaviors included items such as two-word utterances, complete sentences, and the modality of the utterance. Specific motor activities and attending behaviors were incorporated into the gestural categories.

The development of a typology of gestural function was presumed necessary to assess non-verbal behavior (see Appendix). Similar motor acts were hypothesized to express different communicative functions and discrete gestural functions then could be isolated according to the typology.

Gestures were viewed as gross motor acts and included attending behavior as well. Communicative gestures were defined as non-verbal events designed to elicit a response from another person. Non-communicative gestures, in contrast, were not directed towards nor did they request a behavioral response from the other member of the dyad. Included in the typology were categories of gestures which

took notice of person, objects, or events in the environment; effected change on, or demanded change from objects or persons in the environment.

Frequency of occurrence of gestural categories was separately determined for each mother and child for each time period. Additionally, percentages of verbalizations associated with each gestural category were determined.

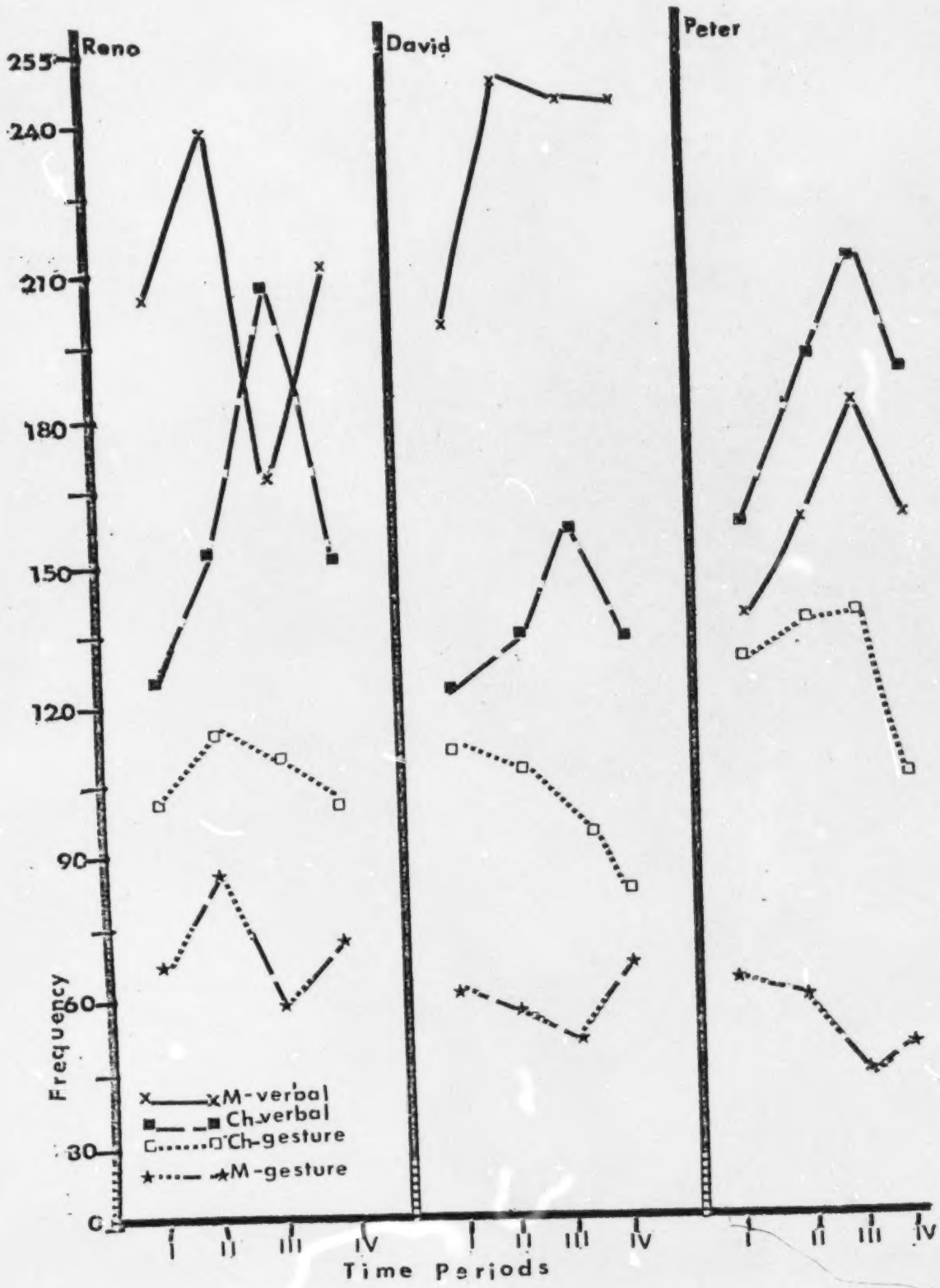
Results

Results were interpreted to mean that gestural behavior may serve as an aid in the acquisition of language. These data indicated that gesture is used to assist the child in acquiring meaning from the environment. All statistical results were obtained by using the chi-square statistic.

Patterns of distribution of both the children's and mothers' frequency of verbal behavior showed significant distributional differences over time. In contrast, the children and mother displayed similar patterns of gestural behavior. As expected, the children's verbal behavior increased, while in general, all the children decreased gestural behavior over time. Further, the children's gestural behavior was found to exceed their mothers' at all time periods studied (see Fig. 1).

Analysis of the children's gestural behavior according to functional categories revealed that non-verbal behavior is used by the language-learning child to express a diversity of functions which change over time.

Fig. 1. Frequency of Occurrence of Verbal and Non-Verbal Behavior for Mothers and Children across Time.


Reno
David
Peter
255
240
210
180
150
120
90
60
30
0
Frequency
M-verbal
Ch-verbal
Ch-gesture
M-gesture
I
II
III
IV
Time Periods

Two-way chi-square analysis of the children's patterns of gestural functional behavior indicated that similarities existed in a number of categories although the scatter of categorical use varied with each child. Table 1 displays each child's proportion of gestural function for each time period studied. Categories predominantly observed at one time period were not the same at subsequent times. Note the decrease in Non-Communicative behavior for both David and Peter from T.I to T.IV from 31% to 4% for David and 16% to 5% for Peter. As Ostensive behavior significantly decreased over time for both Reno and Peter, the correlative increase in Manipulative behavior by 17% for these children was believed important.

Data from this study indicated that with increased linguistic skill the children's need to express communicative functions through gestures decreased. Analysis revealed that the children increased appropriate verbal support for gestural behavior over time. In viewing the gestural behavior accompanied by verbalizations, only those verbalizations appropriately supportive of the gestures were tallied. Appropriately supportive verbalizations were those which expressed the same or similar function as the gesture through the verbal mode; i.e., pointing accompanied by "more." In the above example, "more" functioned as a verbal Imperative appropriately supporting the Requesting gesture,

Table 1. Percentages of Gestural Function for Each Child Across Time.

TABLE 1

Percentage of Gestural Function for Each Child

Verbal Function	Reno				David				Peter			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Ostensive	19.5	7.6	7	10	14.5	12	18	13	9.4	7	11	7.4
Requesting	11	13	1	4	6	6	1	-	15	10	12.7	9
Pantomimic	3	-	7	-	2.8	-	1	8	1	5	1.5	10
Manipulative	6	8.5	20	23	7.2	9	18	4	5	19	8	22
Feature Identification	-	4	1	5	2	5.5	1	5	1	8	10	-
Locative	4	1	8	4	2	1	5	5	2.3	3	7.5	8
Searching	8	8.5	4	1	4.5	30	1	3	2	4	1	1
Object Exchange	19.5	18	4.5	3	6	7	5	8	5	6	4	12
Action	1	2.5	4.5	1	5	2	12	4	10	9	7.5	5
Negative	5	7	4.7	8	6	12	9.5	16	8.6	4.7	5	5
Affirmative	-	-	2	1	-	2	1	4	1	-	2	1
Attending	13	20	9.6	13	8	12	7	11	17	8.5	13	9
Questioning	-	-	1	3	2.8	3	-	15	2	1	6	3
Non-communicative	4	11	11	18.5	31	20	17	4	16	6	6	5
Object-Manipulation	4	6	12	4	1	5.5	3.5	-	7	9	6	7
Total number of Gestures	97	117	110	97	110	109	84	75	128	130	134	103

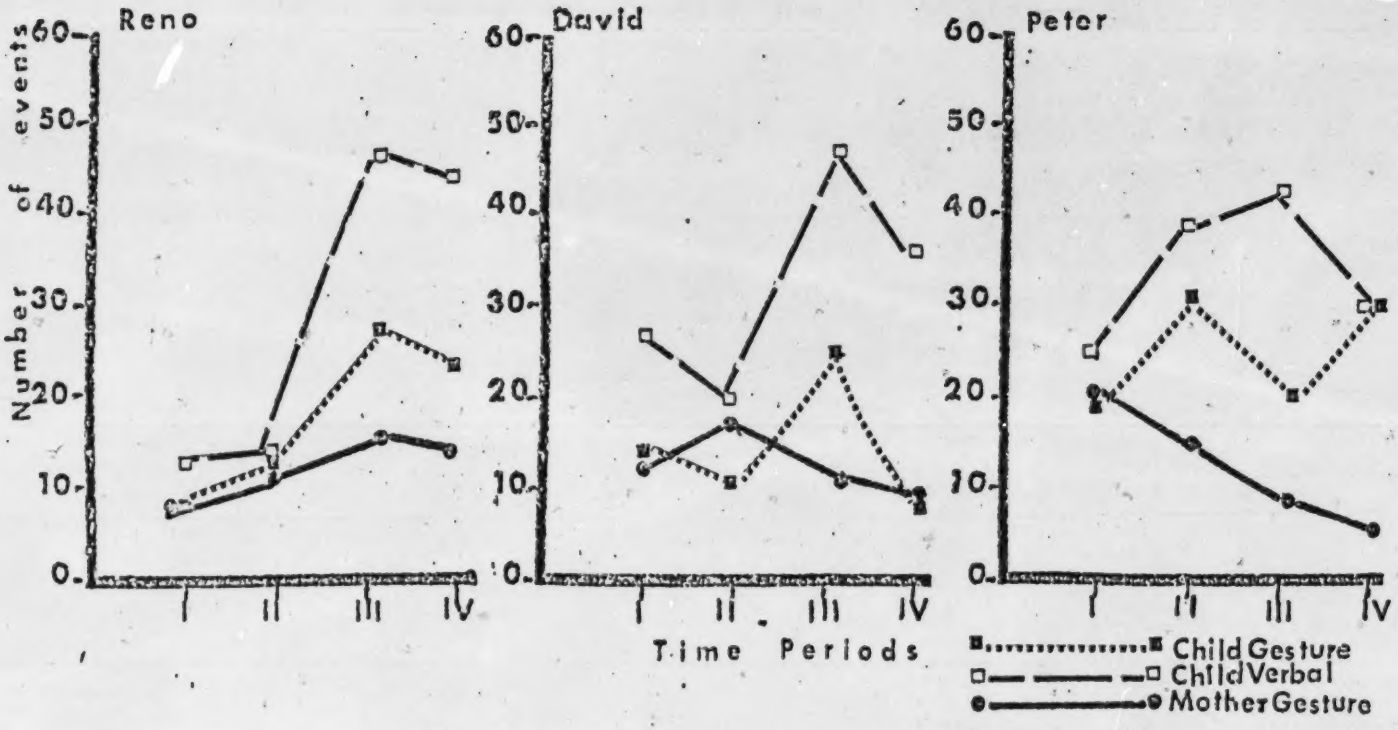
pointing. Analysis of this parameter indicated that Reno and David increased verbal support of gesture by 39% and 29% respectively across time. Although Peter's verbal support of gestural events decreased at Time IV in comparison with Time I, a mean of 62.5% of verbal support during the intervening time periods was indicative of his greater verbal skill than the other children.

Conversely, all children used less gestural support for verbalizations across time. As the child developed the ability to express multiple functions linguistically, less reliance on functional expression through the gestural modality was observed. Reno decreased gestural support for complementary verbalizations by 15% from T.I to T.IV, and David's decrease was 11% across time. Although Peter's 6% decrease of gestural support was observed in comparison of T.'s I and IV, previous decreases of 19% and 14% at Times II and III support the assertion that his linguistic ability to express multiple functions required less reliance than the other children on gestures.

Examination of the typologies of both gestural and verbal events led to recognition that similar functions were expressed through both modes of communication by the children. Thus, pairs of complementary gestures and verbalizations were subsumed under one event category. In Fig. 2, an example of an event category, David expressed 25 verbal Action

Fig. 2. Complementary Gesture and Verbalization Action and Manipulative-Action

Manipulative – Action and Action



functions at T.I, and 14 equivalent gestural events of Manipulative Action. At T.IV, 36 verbal Actions were tallied with a low of 8 Manipulative-Action gestures. In contrast, Reno used 8 gestures which were Manipulative and 12 complementary verbal Actions at T.I. This function was expressed gesturally 22 times at T.IV; however the verbal function of Action occurred 43 times at this time period. Relationships between both modes of communication were analyzed in 9 event categories.

The finding that the mothers used less gesture than their children at all time periods indicated their greater reliance on the verbal mode for communicative expression and their children's concomitant abilities to comprehend linguistic exchange. It was believed that the increase of maternal gestural behavior at T.IV represented gestural use as a strategy to aid their children's comprehension of language. Maternal gestural behavior was also evaluated according to the functional typology. Results demonstrated that maternal gestures also expressed diverse functions that varied over time.

Summary and Conclusions

Previous researchers have viewed discrete motor acts (e.g., pointing, touching, reaching) as generalized gestural behavior which may or may not have importance for language acquisition. In this study, by analyzing the functions

which specific gestures expressed, it was possible to determine a positive relationship between non-verbal and verbal modes of early language performance. Similar motor acts were found to be used for different purposes in communication.

Interpretation of the functions of specific gestural behavior was made possible by analysis of the contexts in which they occurred. Functional intentions were ascribed to gestures based on their ability to effect change in objects, persons, or events. The development of meaning about the world was observed in the children's ability to express a variety of gestural functions during the period of study.

The hypothesis that mothers use gestures to assist in acquisition of environmental knowledge and that their use of gesture would decrease was not fully substantiated. Rather, the observed increase in maternal gestural behavior at T.IV was representative of strategies designed to assess their children's knowledge of the world, to reinforce existing skills, and/or to teach new concepts. The following conversation is an example. Previously David's mother had asked, "What color slippers did you get?"; David's response was to comment on his food.

Verbalizations	Gesture
M: D. got blue slippers. There it is--I see it. Where's your other slipper? Where's the other--what did we do? Where the other one?	M: picks up foot to show him slipper M: holds up other foot without slipper D: shakes head--looks at foot
D: outside.	D: turns and looks toward door
M: It's outside. We washed it--didn't we?	M: nods head

This maternal gestural behavior served to assist in decoding Where. Another conversation between David and his mother at T.IV consisted of reinforcement of color names. By asking the names of specific colors, accompanied by pointing to the colors as named, his mother's gestures were very directive in isolating and teaching environmental knowledge. If David's responses were correct, she confirmed these by repetition. If incorrect, she gesturally isolated the appropriate color, and then verbally and gesturally indicated the correct response. Observation of similar examples were found with the other dyads.

Some researchers (Nelson, 1972; Bruner, 1975; Sugarman Bell, In Press) contend that the pre-verbal child must develop cognitive schema regarding the integration of action and function as necessary presymbolic behavior preceding linguistic productivity. It is clear, from this study, that not all gestural behavior serves to map symbolic representations as a means to achieve linguistic ability. Specific

motor activities such as object Manipulation have specific symbolic functions which are later translated into lexical entries. However, many functions of gestures are designed to expand communicative exchange and are viewed as supportive of linguistic development, rather than as building blocks of linguistic performance.

The communicative functions intended determined whether or not gesture was in lieu of, supportive of, or tangential to speech. Perceptual identification and spatial location gestures provided the basis for isolation of people, objects, or events in the environment. These gestural functions were viewed as primitive comprehension strategies resulting in translation of knowledge about the world into a semantic system. More sophisticated comprehension strategies were evident in the children's use of gestures to explore and manipulate objects as linguistic information was simultaneously decoded. Frequent observations of a child acting upon an object as his mother talked about it were noted. Also, participants in dyadic exchange were observed to initiate and/or alter a conversational topic based on gestural behavior of the other.

Slobin (1973) in discussing language acquisition has observed that children may rely on old forms as transitional stages in the acquisition of new linguistic functions. Similarly, these data revealed that children may rely on

previously productive gestural functions in the process of acquiring new linguistic forms. Prior to the acquisition of some verbal functions, children expressed complementary functions gesturally. As the verbal function became more productive, gestural behavior decreased accordingly. During the process of acquisition of new linguistic forms, the children relied transitionally on gestural forms to express new functions.

Maternal gestural behavior also expressed multiple functions. While gestures used to isolate objects and events predominated initially, subsequent use of gesture seemed to provide tangible support for complementary verbal expressions. If mothers were uncertain whether or not the children were understanding a linguistic exchange, gesture was used to substantiate the verbalization. Maternal gestural behavior enhanced the acquisition of meaning by demonstrating relationships between people and objects, objects and objects, people and people. When the children neither expressed a specific linguistic function nor increased its use from the previous time period, mothers increased their use of the complementary gestural function. This appeared to cue the children by providing tangible reference to some specific relationship as a linguistic form was emerging. Maternal gestures provided both denotative and connotative information necessary for the child to extract meaning from

the environment and ascribe communicative intentions to people.

Clearly, development of communicative competence relies not only on the decoding of the acoustic stimulus but on a combination of behaviors both gestural and verbal. As a strategy in the acquisition of meaning, gesture is viewed as a powerful force in the emergence of language.

Appendix

TYPOLOGY OF GESTURES

Definition of Terms

1. Ostensive--isolating and/or identifying tangible object, person, or event in the environment. Observed in pointing, touching, and holding.

2. Requesting--indication of wanting something or someone in the environment. Observed, e.g., reaching towards, pulling, pointing.

3. Pantomimic--acting out of form or function of person or object, e.g., opening and closing of hands illustrating biting.

4. Manipulative--exploratory manipulation of object expressive of its function or manipulative behavior expressing possible alternate function of object.

5. Feature identification--gestural description of feature of person(s) or object(s), e.g., demonstrating size, shape, number, etc.

6. Locative--identifying place of or locus of action of person, object, event.

7. Searching--characterized by sustained looking for person or object. May include something or someone not evident in the immediate environment.

8. Object Exchange--indicative of communicative exchange between members of dyad, i.e., giving, taking.

9. Questioning--expressing uncertainty or doubt regarding the identification of or the function of object, person, or event.

10. Action--gestural behavior expressing action and not including an object, e.g., sitting down.

11. Affirmative--behavior characterized by approval of or satisfaction with behavior of person.

12. Negative--gestural behavior characterized by expression of non-existence, rejection, denial, e.g., pushing away, head shaking, pulling or turning away.

13. Attending--characterized by sustained eye contact or gaze, expressive of attention, concentration, or questioning.

14. Non-Communicative--meaningless gestures which are context free, e.g., splashing.

15. Non-Communicative Object-Manipulation--gestural behavior expressing meaning of object function. Non-communicative in that not directed towards another nor dependent on other's initiation or response.

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